United States
Environmental Protection
Agency

Solid Waste and
Emergency Response
(55026)

EPA 520-F-93-001
Spring 1993

EPA

Superfund At Work

Hazardous Waste Cleanup Efforts Nationwide

Triana/Tennessee River Site Profile

Site Description: Rural area, within the boundaries of a national wildlife refuge and a U.S. Army Installation

Site Size: An 11 -mile stretch of two tributaries of the Tennessee River

Primary Contaminants: DDT and related degradation products (DDD, DDE)

Potential Range of Health Risks: Kidney ailments, central nervous system disorders, and increased risk of cancer through direct ingestion

Nearby Population: 600 in Triana and several hundred in nearby towns

Ecological Concerns: Bald eagle and migratory birds; habitat for several endangered species

Year Listed on the NPL: 1983

EPA Region: IV

State: Alabama

Congressional District: 5

Success In Brief

EPA and Olin Clean Up Triana Site: "A Major Victory for the Environment'

The rural community of Triana, Alabama is no longer exposed to DDT contamination, due to efforts by the U.S. Environmental Protection Agency (EPA) and Olin Chemical Corporation. Cleanup at the Triana/Tennessee River also involved the participation of the local community and a variety of state and federal agencies. Although contamination at the site occurred over a 23 year period, DDT levels in river sediments have been reduced by over 90% in only five years. EPA's efforts included:

- Reaching an agreement with Olin to perform the cleanup, valued at over $30 million;
- Designing a comprehensive cleanup plan for an 1 l-mile stretch of the Tennessee River system;
- Re-routing a portion of the Huntsville Springs Branch River, a tributary of the Tennessee River; and
- Receiving the support of the local community.

The site's success is measured not only by the innovative measures taken to cleanse the river system, but by the full cooperation of Olin throughout the enforcement process. Olin and EPA's efforts at the Triana/Tennessee River site have achieved, in the words of former EPA Assistant Regional Administrator Howard Zeller, "a major victory for the environment."

Photo: Olin Chemical Corporation

Olin's crew encounters Wheeler Wildlife resident. An American alligator wandered onto the Triana/Tennessee River cleanup area, and was safely returned to the refuge.

The Site Today

Construction and cleanup are complete. DDT levels in fish and water are decreasing steadily, and wildlife habitat has improved significantly. Olin is monitoring three species of fish, as well as surface and ground water, and sediment migration. Providing DDT levels continue to drop and remain at federal standards, the site will again be reviewed by EPA in 1998, to assure that court-ordered performance standards have been attained.

A Site Snapshot

The Triana/Tennessee River Superfund site consists of an 11-mile stretch along two tributaries of the Tennessee River, the Huntsville Spring Branch and Indian Creek.

The nearby Wheeler Wildlife Refuge (WWR) provides a sanctuary for nearly 60,000 migratory birds, as well as habitat for several endangered species, including the bald eagle, gray bat, Indiana bat, American alligator and mollusks. Established in 1937, WWR was among the first protected wildlife refuges in the nation.

Commercial DDT production began in the area in 1947 at Redstone Arsenal in Huntsville, Alabama, by a firm which subsequently went out of business. In 1954, Olin purchased the business from the previous owner. DM production was resumed and continued until 1970. The insecticide was banned from the US. market in 1972.

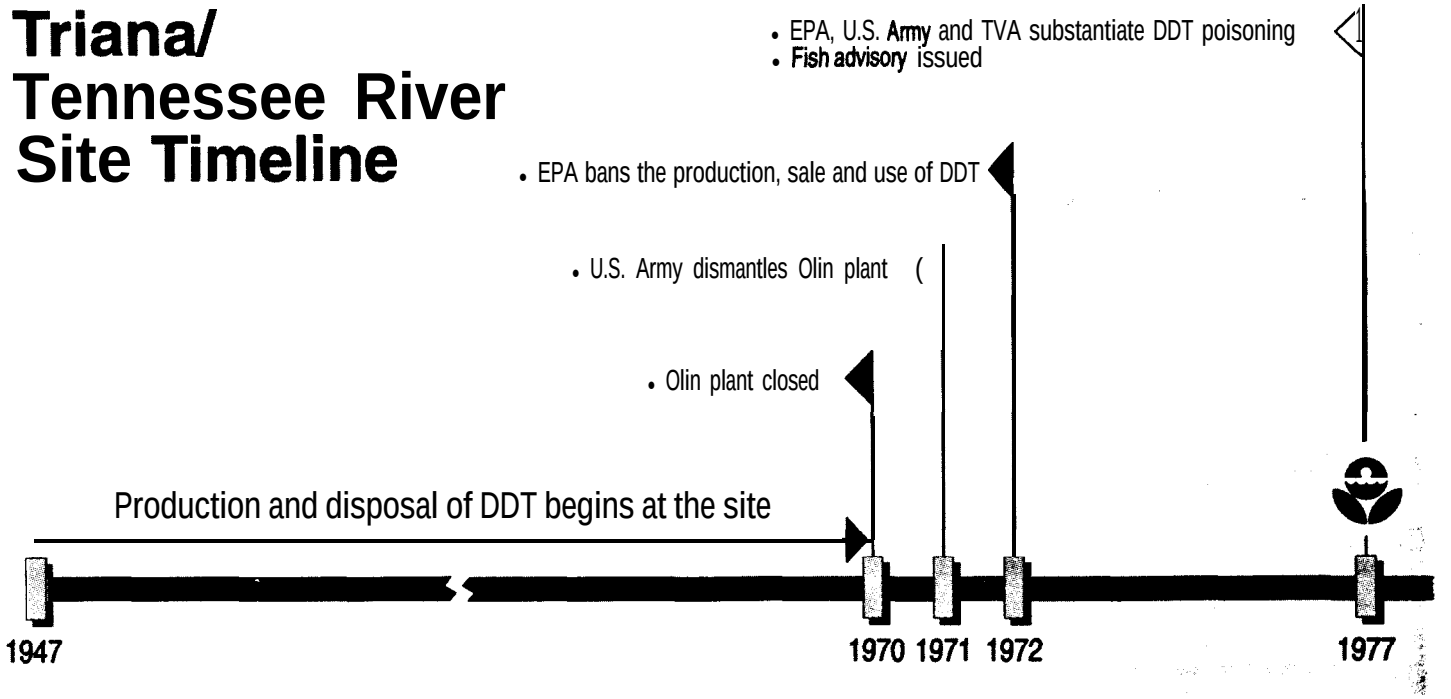
During manufacturing, Olin discharged DDT wastewater into drainagechannelsfeedingintothe Huntsville Spring Branch, 11 miles upstream from Triana. Approximately 409 tons of DM accumulated in the nearby tributary system. The plant was closed and demolished by the US. Army in 1971, but local residents and the surrounding environment — including fish and the national wildlife refuge — were contaminated with DM, a probable human carcinogen.

The rivers provided drinking water until 1967. In addition, several species of fish (channel catfish, largemouth bass and buffalo fish) inhabit the rivers, supple menting the income and diet of this rural community. In the most extreme cases, DM levels in local fish exceeded 100 parts per million (ppm) -20 times the guideline level set by the Food and Drug Administration.

Many Triana residents have beenaffeckdtosomedegreeby DM. Althoughquestions were raised as to the linkage of illnesses caused by DDT exposure, one thing was certain: the community had lost an essential source of food and income — the fish of the Tennessee River system.

As a public health precaution, the State of Alabama issued a fish consumption advisory in September 1991 for residents in the Indian Creek/Huntsville Spring Branch area, including Triana, citing high DDT levels. This extended a previous fish advisory that had been in effect since 1978.

Triana/ Tennessee River Site Timeline



Cooperative Cleanup Efforts Overcome Long History of DDT Pollution

EPA Involvement at Site Pre-Dates Superfund

EPA became involved at the site before the enactment of Superfund. In 1977 EPA, the U.S. Army and the Tennessee Valley Authority (TVA) began joint investigations of the site area. DDT contamination was found throughout portions of the river system. TVA issued advisories to the public regarding the dangers of consuming local fish. The U.S. Fish and Wildlife Service posted signs along the river, warning the public that local fish were contaminated with DDT. Eight days before the passage of Superfund legislation, EPA brought a legal action against Olin, pursuant to the *Rivers* and Harbors *Act* of 1899, one of the few enforcement tools available at the time. Once Superfund was passed in 1980, EPA acquired new enforcement authorities.

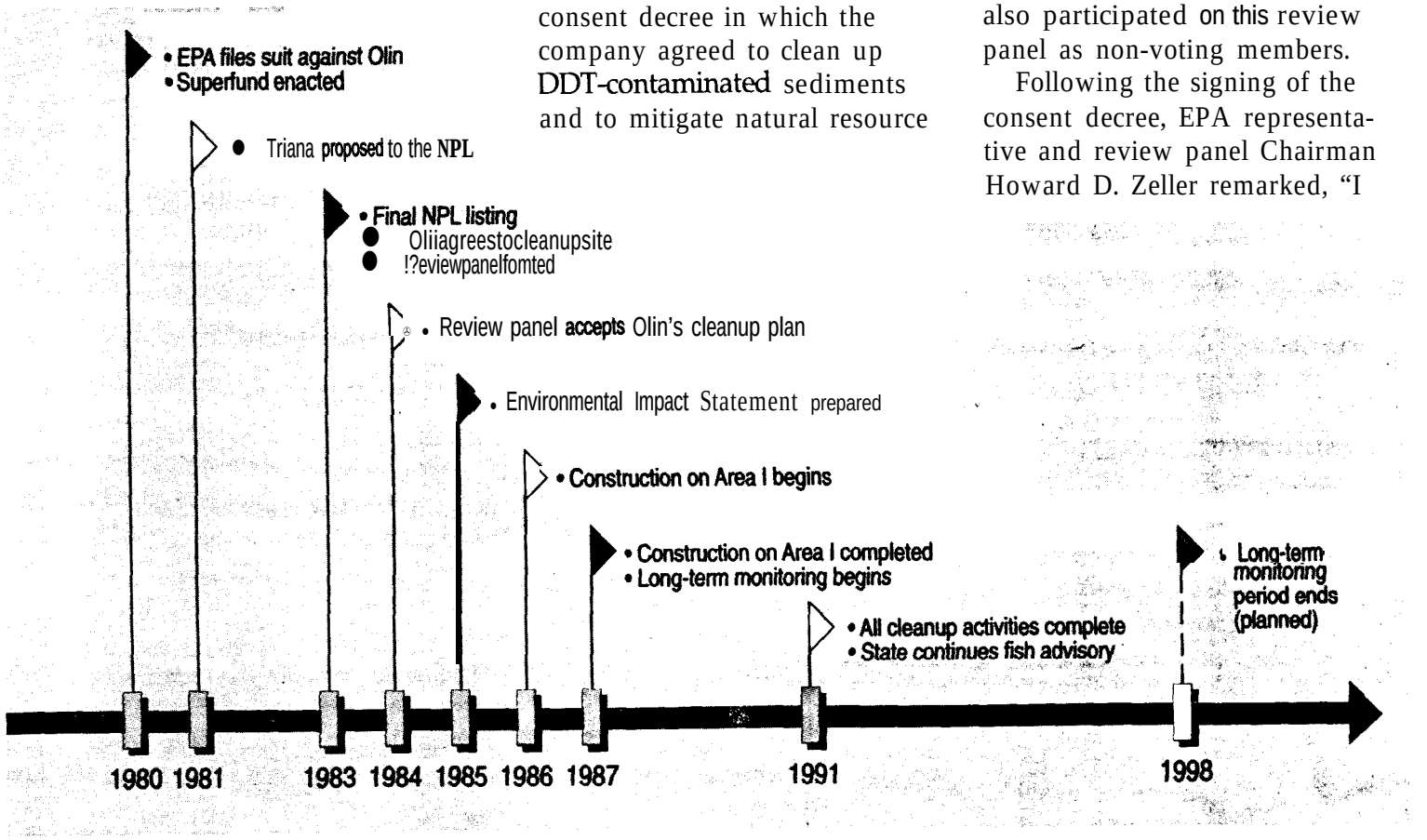
In 1981, the site was proposed for inclusion on the National Priorities List (NPL), EPA's roster of sites requiring long-term cleanup. In 1983, the Triana/Tennessee River site was formally added to the NPL, making Triana one of the Superfund program's earliest sites.

EPA's Enforcement Matched by Olin's Cooperation

In 1983, EPA and Olin signed a consent decree in which the company agreed to clean up DDT-contaminated sediments and to mitigate natural resource damages. To date, Olin has paid over $30 million in cleanup costs. In addition, the company has consistently met all EPA deadlines.

To oversee Olin's compliance with the terms of the court-approved agreement, a multi-agency review panel was created, consisting of four federal agencies (EPA, the U.S. Army, TVA, and the Fish and Wildlife Service) and the Alabama Department of Environmental Management (ADEM). The panel, headed by EPA, was charged with overseeing Olin's work at the site until its satisfactory completion. Members of the Town of Triana and the Olin Chemical Corporation also participated on this review panel as non-voting members.

Following the signing of the consent decree, EPA representative and review panel Chairman Howard D. Zeller remarked, "I



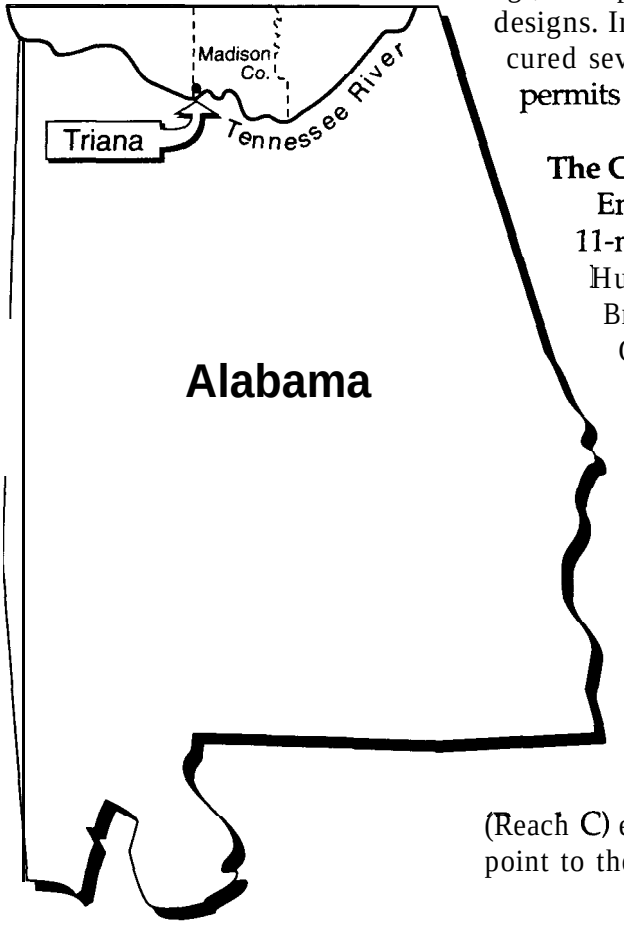
view this as a continued indication of cooperation on behalf of the Corporation, the Town of Triana, and the state and federal agencies represented on the Review Panel... Olin's efforts are a positive improvement to the environmental quality of this area."

"Olin's [cleanup] efforts are a positive improvement to the environmental quality of this area."
— Howard Zeller, EPA Official

Multi-Agency Review Panel Oversees Design

The review panel met over 30 times between 1983 and 1991. Meetings were open to the public and were announced by EPA to local news media and the national wire services. Cooperation among the different members of the review panel was excellent, according to one participant.

The review panel collectively took on the traditional role of EPA in generating technical plans and reviewing Olin's proposed designs. From 1984 to 1986, the panel evaluated Olin's proposals for cleaning up the most contaminated tributary, the Huntsville Spring Branch. In August 1984, Olin submitted its design for the first portion of cleanup. In addition, USACE submitted an Environmental Impact Statement (EIS), addressing the proposed federal actions and potential effects. Olin and the review panel spent the better portion of 1985 finalizing the EIS, continuing sampling, holding public meetings, and preparing engineering designs. In addition, Olin secured several federal and state permits before work began.



The Cleanup Plan

Engineers divided the 11-mile stretch of the Huntsville Springs Branch and Indian Creek into three areas, or reaches. Area I (Reach A) comprised a three-mile portion of the Huntsville, where the vast majority of contamination was located. Area II (Reach B) identified the point at which the Huntsville and Indian Creek converge. Finally, Area III (Reach C) extended from that point to the Tennessee River.

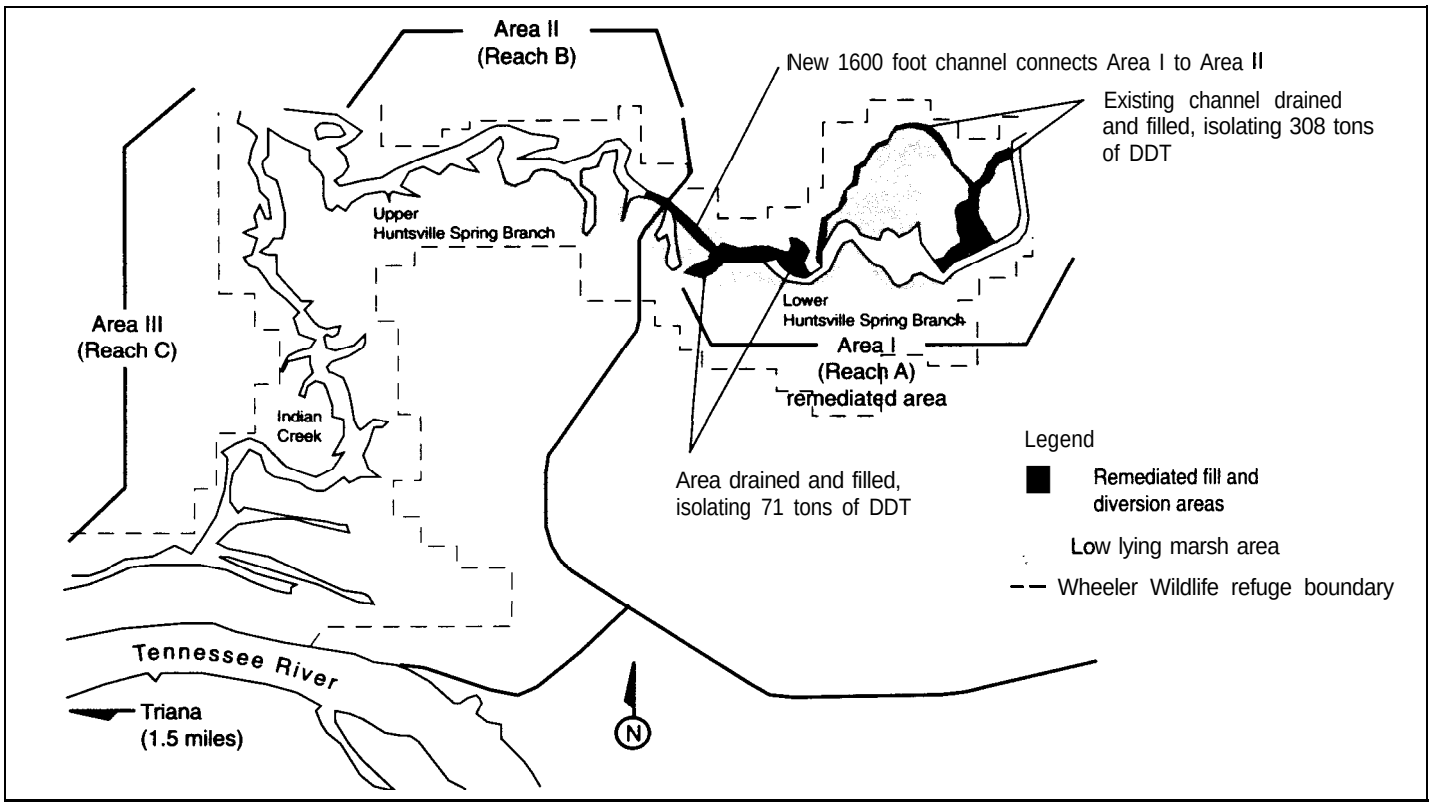
For Area I, the review panel initially considered dredging the channels and disposing of the DDT-contaminated sediments offsite. Upon further evaluation, however, they decided that dredging could destroy aquatic and wetland habitats and potentially expose downstream populations to the contamination. Another alternative-building low-level dams to halt the movement of contaminated sediments — was also considered. This option was rejected as well, since it would not attain required standards. The review panel decided that the best alternative was stream diversion and burial of DDT-contaminated sediments.

Engineers divided the 11-mile stretch of the Huntsville Springs Branch and Indian Creek into three areas, or reaches.

Stream Diversions Dramatically Lower DDT Levels

Work began on the upper portion of Area I in April 1986, to isolate 308 tons of DDT-contaminated sediments. Cleanup personnel drained and rerouted the water from this area by constructing diversion ditches and levees, linking the upper and lower portions of Area I. Once drained of water, the exposed DDT sediments were covered with state-of-the-art, durable fabric and crushed rock. The area was then filled in with clean soil and re planted with vegetation.

In December 1986, the review panel approved Olin's second cleanup design for the lower portion of Area I. A new 1,600



foot channel between the upper and lower portions of the area was built to drain and divert clean water from this second section of heavy DDT concentration. In this bypassed section, 71 tons of DDT were isolated. Just as in the upper portion of Area I, contaminated soil was buried, covered, and replanted. As a result, the stream flowing throughout Area I ultimately was connected to the rest of the Huntsville Spring Branch/Indian Creek system, containing significantly lower levels of DDT.

As for the remaining two Areas of the Triana site, DDT contamination remaining in river sediments was comparatively small. EPA determined that the best course of action in these two Areas was to conduct long-term monitoring of water, sediments and fish to ensure that DDT levels diminished and remained at court-approved levels.

Cleanup Activities Eliminate 93% of Contamination

In October 1987, the construction work on both portions of Area I was completed. Three miles of contaminated stream channels had been successfully isolated and rerouted. During operations, Olin constructed over five miles of access roads, over one mile of new stream channel, and over two miles of diversion structures. Some 150,000 cubic yards of soil were removed. Approximately 217,000 cubic yards of clean soil and 190,000 cubic yards of rock were used to fill in contaminated portions of Area I. Altogether, 28,000 truck loads of clean soil and rocks were transported to the site. The total amount of DDT sediments contained and buried at the site amounted to *379* tons — *93%* of all contaminated sediments estimated to be in the river system.

The cleanup effort was twice nominated for a National Wildlife Corporate Conservation Council Award.

All In a Night's Work

The Triana site lies partially within the boundaries of the U.S. Army's Redstone Arsenal. The focal point of the construction activity was located within the restricted access area of a missile range and a NASA spaceflight center — one of the world's most advanced laser technology and testing stations. Therefore, Olin was obligated to work within the Army's and NASA's tight security restrictions to gain site access to conduct the cleanup. This was accomplished *by working at night under flood lights.*

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Triana Community Plays An Active Role

For the past 30 years, the Town of Triana has been on a steady course of economic revitalization. The mid-1960s and 1970s marked a turn-around for Triana, from the installation of running water in 1967 to the building of public housing, recreational areas and the development of new industries for the town. These activities resulted from the tireless efforts of Clyde Foster, the popular mayor of Triana from 1954 to 1984.

The population grew to nearly 600, as people became attracted to the progressive development taking place in this small, northern Alabama town. Indeed, things were looking up for the town when the DDT contamination was detected.

Triana residents and area fishermen were suddenly faced with the hazardous poisoning of their most valuable resource, the river itself. Thus began the long-tam involvement of the community in the day-today cleanup of their river. The town was also forced to find the best way to address the health impacts of DDT on the community.

EPA Involves Residents in Cleanup Decisions

As with all Superfund sites, EPA staff inform affected communities through public meetings and printedmaterialsexplaining current and proposed actions at the site. Triana residents were active throughout the cleanup process and participated regularly in the various public meetings with EPA and Olin. Residents were represented on the review panel by a non-voting member. For example, in July 1984, over 400 people — two-thirds of the town's population — appeared at a public meeting held by EPA to discuss alternatives for the upper portion of Area I. ln *October 1986,* over 100 people attended an EPA-sponsored public meeting to discuss the cleanup progress and the proposed plan for the lower portion of Area I.

"It's something all of the citizens have been anticipating. We look forward to fishing again in the waters of our back door."
— Alonzo Toney,
Former Mayor of Triana

In the aftermath of the cleanup, the community is satisfied with the results and with EPA's handling of the effort. Moreover, the public is relieved that the imminent threat of DDT is past. Community members still attend biannual review panel meetings. Alonzo Toney, the former mayor, anticipates a return to normal pastimes: 'It's something all of the citizens have been anticipating. We look forward to fishing again in the waters of our back door." Today, residents of Triana are looking forward to a new era for their children and grandchildren.

Triana Cleanup

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Working at night required more intensive management and coordination with the Army, as well as a host of construction companies to ensure delivery of raw materials to the site. Nevertheless, Olin never missed a deadline, and no adverse environmental effects occurred during these nighttime operations.

Cleanup Complete, Long-Term Monitoring Continues

By 1990, as a result of cleanup efforts, the overall ranges of DDT concentrations in fish had dropped by as much as 86 percent, while DDT levels in the waters decreased by 93 percent. Considering the poisoning of the river system was 23 years in the making, the river and the wildlife are making a dramatic comeback.

The cleanup effort was twice nominated for the National Wildlife Corporate Conservation Council Award in 1990 and 1991. The National Wildlife Federation presents this award for outstanding corporate responsibility toward the environment. The award recognizes innovative and creative accomplishments in cases where site cleanup has generated proven economic and environmental benefits.

DDE The Consequences of Exposure

DDT is a highly toxic and inexpensive chemical which received the widest commercial marketing of any insecticide in the history of U.S. agriculture. DDT was patented in 1942 and produced until 1972, when its production, sale and use were banned by EPA. Research indicates that, because of DDT's widespread usage throughout three decades, anyone born in the U.S. between the mid-1940s and 1970s has had some exposure to the chemical through their food. Fortunately, DDT concentrations per capita have been steadily declining since the 1970s.

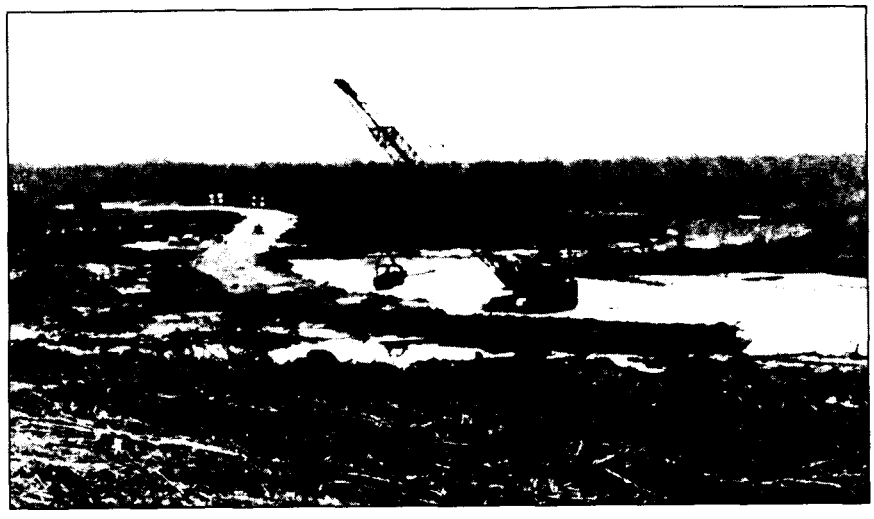
Direct ingestion of high concentrations of DDT (10 ppm or greater) may potentially damage the central nervous system. DDT is stored in fatty tissues, therefore its concentration will increase over prolonged periods of low-dosage exposure. Symptoms from ingesting high quantities of DDT include: acute nervous tension, dizziness and convulsions. In addition, liver deterioration, cancer and reproductive complications have been associated with DDT poisoning. In wild, fish-eating birds, DDT poisoning at levels greater than 5 ppm results in weaker eggshells and greater vulnerability of offspring. This phenomenon has been especially noted in the case of bald eagles and other rare and endangered species.

Fish, birds and humans absorb DDT into their systems by ingesting water and/or food contaminated with DDT. Fish absorb the contamination from other fish; birds consume fish and accumulate DDT. At the top of the food chain, hurnans consume both fish and sprayed crops, such as vegetables and grains, accumulating still higher concentrations of DDT and storing it in fatty tissues.

Photo: John Cossick, U.S. Fish and Wildlife Service

Photo: Ermano Vaniso. U.S. Fish and Wildlife Service

The American bald eagle is among the endangered species that are known to nest in the Wheeler Wildlife Refuge (right). The blue heron (left) is another inhabitant of the refuge, a sanctuary for over 60,000 migratory birds. Blue herons are widespread throughout North America, and depend on the nation's abundant lakes and marshes for feeding and reproduction.



Olin cleanup workers dredge a stream channel in Lower Reach A of the Huntsville Spring Branch. This new 1,600 foot channel connects the upper and lower portions of the river area, by-passing 71 tons of DDT-contaminated sediments.

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Success at Triana

Cooperation between EPA, Department of the Army, FWS, TVA, State of Alabama, the town of Triana, and the Olin Corporation has been the main ingredient of this successful cleanup. As a result of EPA's effective, multi-lateral enforcement and full compliance by the company, Triana residents may once again look forward to a healthy future for themselvesand generations to come. L&wise, local fish and wildlife will have a secure habitat for their offspring. The DDT contamination that has plagued this riverareaforsomanyyearsis rapidly becoming a distant memory.

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